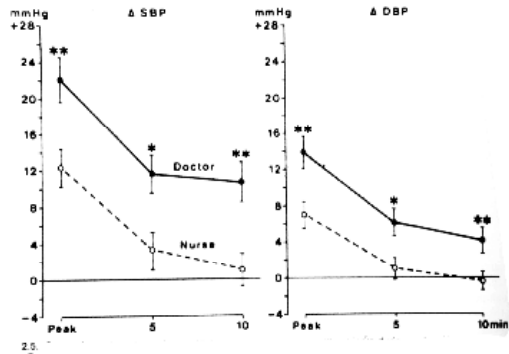


WHITE COAT HYPERTENSION —Its Relevance Today

White Coat Hypertension (WCH) refers to the increase in blood pressure measured by the presence of a physician or other medical person. Furthermore, the increment in blood pressure parallels the hierarchical position of the person monitoring the blood pressure, *e.g.*, a nurse has a lesser effect on the blood pressure elevation than a general medical practitioner who has less effect than the head of the medical division (Mancia, *et al.*, 1987). It seems that this reflex increase in blood pressure is a form of conditioned response that decreases through habitation (Pickering *et al.*), although individual responses vary.

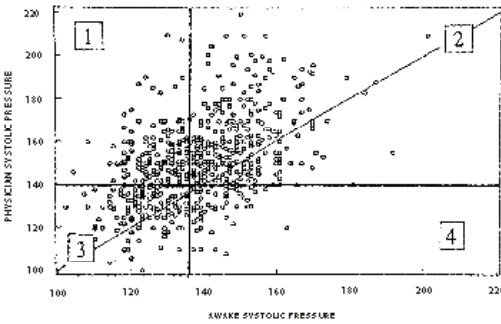
Definition

White coat hypertension has been defined as a casual diastolic pressure above 90 mm Hg when measured by a physician in a patient with a mean diurnal ambulatory diastolic pressure below 90 mm. Hg (Pickering, *et al.*). Ambulatory recording involves a longer observation time than a single casual blood pressure reading. The white coat effect is defined as the difference between the office and average daytime values of systolic and diastolic blood pressure.



Comparison of rises in systolic and diastolic blood pressure during with a physician and a nurse

(KAPLAN N.M)



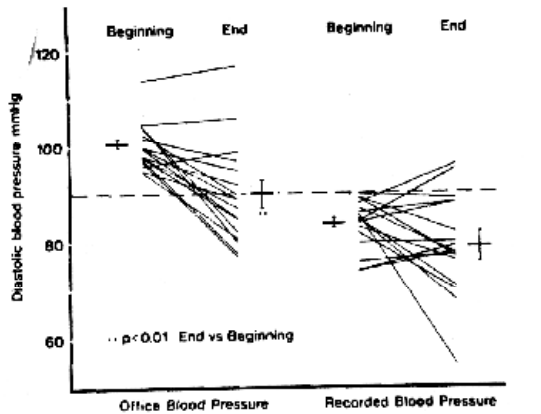
- 1. White Coat Hypertension
- 2. Sustained Hypertension
- 3. Normal blood pressure
- 4. Clinic blood pressure underestimated

Diurnal blood pressure only is compared as sleep normalises blood pressure in mild hypertensive patients. Clinic rather than home or self-measurement is used for assessment of casual diastolic blood pressure because many hypertensive (high blood

pressure) patients normalise their blood pressure when relaxed and resting. In established hypertension, individuals generally have elevated blood pressure regardless of the situation. Non-invasive ambulatory blood pressure monitoring over 24 hours allows white coat hypertension to be detected (Pickering, *et al.*).

Prevalence

Prevalence of white coat hypertension varies according to the population of hypertensive patients studied (Verdecchia, *et al.*, 1992) and depends upon the accepted definition and has been demonstrated in 21-58 per cent of hypertensive subjects without end organ injury. White coat hypertension can be demonstrated in 20 to 25 per cent of younger patients with mild to moderate hypertension (Trenkwalder, 1993).



Significance of White Coat Hypertension

Measurement of blood pressure by a physician may trigger a pressor response and hence generally produces higher values. This so called white

coat effect has a high inter-individual variability and explains, at least partially, the marked difference between office and ambulatory or self measured blood pressure measurements.

There is disagreement on the significance and prognostic implications of white coat hypertension. Some believe that physician induced rise in blood pressure represents a marker of the patients response to the stress of every day life. Whereas others hold the view that the white coat effect is a benign conditioned response. It has also been demonstrated that target organ damage especially left ventricular hypertraphy, (heart enlargement,) is more closely related with ambulatory than office blood pressure. Therefore for some, white coat effect is an alarm response and its extent is taken to be a marker of the patient's response to the stresses of everyday life.

For others, the white coat effect is a conditioned response stemming from a defence reflex, independent of true fluctuations in blood pressure and is an essentially benign phenomenon. Target organ damage (heart, brain, kidneys and retina) from hypertension appears to be better correlated with ambulatory than office value blood pressure although prognostic significance of the ambulatory value remains to be established. The daytime ambulatory value is effected by a variety of factors (physical activity, emotions, duration of sleep, etc.) which may in turn effect the estimation of white coat effect. Night time ambulatory values or self measured values do not seem to be affected by the stress of every day life.

Different studies have demonstrated that White Coat Hypertension patients do not have an enhanced blood pressure variability as reflected both by the standard deviation of ambulatory blood pressure and by home-work blood pressure difference. These findings are consistent with the hypothesis that the white coat phenomenon is a specific effect on blood pressure related to the clinic setting rather than a manifestation of a generalised hyperreactivity.

The hypothesis is further confirmed by the lack of correlation between clinic-to-day time blood pressure difference and blood pressure changes from baseline induced by the laboratory tasks in hypertensive patients. It is argued that the discrepancy between blood pressure response to the doctor's visit and to laboratory stressors may be due to the different

psychophysiological mechanisms responsible for them. Anger and anxiety which are involved in modulating blood pressure reactivity to laboratory stressors do not seem to play a major role in white coat phenomenon. Pickering, *et al.*, observed that clinic-to-day time blood pressure difference was higher in hypertensive patients than in normotensive subjects and they hypothesized that white coat effect could be a learned conditioned response, in which fear originally induces an increase in blood pressure and subsequently, the awareness of hypertension determines an increased sympathetic arousal so that the blood pressure remains high over repeated visits.

Cardiovascular Risk

Another interesting and cogent point is whether patients with White Coat Hypertension are at a greater cardiovascular risk than normotensive subjects.

These concerns have prompted major efforts to detect end organ damage by noninvasive tests, e.g., left ventricular hypertrophy (heart enlargement) by echocardiography, carotid artery atherosclerosis by ultrasonography, integration on other cardiovascular risk factors like smoking, diabetes, cholesterol and measurement of biochemical factors related to the occurrence of complications, e.g., renin.

Verdicchia *et al.*, demonstrated that the prevalence of left ventricular hypertrophy (heart enlargement) determined by echocardiography, was higher in patients with ambulatory hypertension than in patients with White Coat Hypertension who have a greater incidence of left ventricular hypertrophy than their normotensive controls. Pujads and Mora-Macia found no difference in the incidence of cardiovascular events between patients with White Coat Hypertension and patients with mild hypertension.

Absolute blood pressure may be a less sensitive predictor of left ventricular hypertrophy than the extent of blood pressure elevation resulting from any stimuli. Cavallini *et al.*, in a age sex matched group of individuals have studied cardiac and carotid structure and found resemblance of normotensive subjects and differ significantly from those in age and sex matched sustained hypertensive subjects. They have concluded that White

Coat Hypertension is benign and needs no pharmacological intervention. Peirdomanico and his coworkers noted significantly lower values of Left Ventricular mass index, intima/media thickness, minimum forearm vascular resistance and urinary albumin excretion values in white coat hypertensive subject.

The study included three groups balanced for sex, age, bodymass index and smoking of 50 sustained hypertensives, 25 white coat hypertensives and normotensives. They concluded that there was no significant difference between white coat hypertension and normotensives. Philippa Gosso, *et al.*, concluded that white coat effect has no influence on left ventricular mass, in a study 204 essential hypertension patients [140 males, 64 females, mean age SD 50 (11) years] favouring the view that white coat hypertension is a benign condition. However, Carmine Cardillo *et al.*, (1992) found in their studies that white coat hypertension was associated with left ventricular structural and filling abnormalities, suggesting it could not be considered an entirely innocuous clinical condition.

Limitations

The white coat effect, an alarm reaction to the presence of a doctor, is an important cause of blood pressure variability, the frequency, amplitude and mechanisms of which are partially understood. Physician measured office blood pressure may not provide a representative estimate of an individuals usual blood pressure outside the medical setting and have important limitations including potential for misclassification of hypertensive status in individual patients and suboptimal prediction of cardiovascular risk. The risk for an inaccurate diagnosis of hypertension and inappropriate drug treatment are especially great when physician measured blood pressure saddles the conventional threshold for diagnosis of hypertension and initiation of the drug therapy.

Being labelled as hypertensive has been shown to decrease one's sense of well-being and increase work absentism and can lead to decreased availability of life, health and disability insurance as well as increased premiums. Drug treatment frequently causes bothersome symptoms or adverse metabolic effects. Further, the cost of hypertension treatment are substantial. Finally uncertainty persists over benefits of drug therapy in individuals with slight elevations of blood pressure.

Ambulatory and Self Measurehent of Blood Pressure

Available evidence strongly suggests but do not unequivocally establish useful clinical roles of ambulatory and self measurement benefits. The most important potential benefits of ambulatory and self measurement devices would be more accurate classification of blood pressure, better prediction of cardiovascular risk, ability to monitor blood pressure response to treatment and improved compliance with therapy. It also helps accurate blood pressure classification.

Harm of ambulatory blood pressure monitoring and blood pressure self measurement are increased cardiovascular risk if treatment were inappropriately withheld, inconvenience and arm soariness from multiple cuff inflations and accuracy of these techniques. Self measurement devices increase anxiety. Regular calibration and careful adherence to standard measurement techniques are essential. Most practicing physicians do not own ambulatory blood pressure recorders and therefore probably have to obtain the services by referrals.

Policy Options

1. Policy makers should endorse use of both technologies as standard practice based on the apparently favourable balance between benefits and risks.
2. Policy makers could argue that existing evidence is insufficient to support any application of these technologies. For ambulatory blood pressure monitoring would override the importance of cost effectiveness rather than a net benefit.
3. *Intermediate* : To endorse these technologies only for indications that are best supported by existing evidence, *eg.*, ambulatory monitoring in low risk patients with suspected hypertension. For self measurement devices, a wide range of applications could be considered, accepting a lower standard of scientific proof because of lesser cost consequences. One should favour this intermediate position.

Conclusion

White Coat Hypertension may result in overestimation of blood pressure values or an underestimation of effect of antihypertensive treatment. Therefore it is important to be aware of this phenomenon and recognise

the short-comings of casual blood pressure measurements. It is worth remembering that the aim of measurement is to treat mean blood pressure not variability or reactivity. Aspects of treatment directed at controlling the emotional reactions including muscle relaxation, transcendental meditation, deep breathing exercise, physiotherapy or anxiolytic therapy help to decrease the alert reaction and thus lower the blood pressure.

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